

CLAIMS

We claim:

- 5 1. A high-performance piston core, comprising:
 a first piston cylinder;
 a second piston cylinder; and
 a piston center, the piston center longitudinally disposed between and
magnetically coupling the first piston cylinder and the second piston cylinder,
10 wherein the piston center is made of high-performance magnetic
material.
2. The piston core of claim 1 wherein the high-performance magnetic
material is selected from the group consisting of Cobalt steel (CoFe), Silicon steel (SiFe),
15 Vanadium/Cobalt steel (Permendur), and alloys thereof.
3. The piston core of claim 1 wherein the first piston cylinder is made of
conventional magnetic material.
- 20 4. The piston core of claim 3 wherein the conventional magnetic material is
selected from the group consisting of low-carbon steel, SAE 1010 steel, SAE 1006 steel,
SAE 1008 steel, SAE 1018 steel, SAE 1020 steel, and sintered powdered iron materials.
5. The piston core of claim 3 wherein the second piston cylinder is made of a
25 material selected from the group consisting of conventional magnetic material and high-
performance magnetic material.
6. The piston core of claim 1 further comprising an end longitudinally
attached and magnetically coupled to the piston center, wherein the first piston cylinder
30 comprises a ring disposed about the end.

7. The piston core of claim 6 wherein the end is made of the high-performance magnetic material.

5 8. The piston core of claim 1 wherein the piston center is laminated.

9. The piston core of claim 1 wherein the first piston cylinder is laminated.

10 10. A high-performance piston core, comprising:
an inner core, the inner core having a first end, a piston center, and a
second end;
a first ring disposed about the first end; and
a second ring, the second ring being disposed about the second end,
wherein the inner core is made of a high-performance magnetic
15 material.

11. The piston core of claim 10 wherein the high-performance magnetic
material is selected from the group consisting of Cobalt steel (CoFe), Silicon steel (SiFe),
Vanadium/Cobalt steel (Permendur), and alloys thereof.
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12. The piston core of claim 10 wherein the first ring is made of conventional
magnetic material.

13. The piston core of claim 12 wherein the conventional magnetic material is
25 selected from the group consisting of low-carbon steel, SAE 1010 steel, SAE 1006 steel,
SAE 1008 steel, SAE 1018 steel, SAE 1020 steel, and sintered powdered iron materials.

14. The piston core of claim 12 wherein the second ring is made of a material
selected from the group consisting of conventional magnetic material and high-
30 performance magnetic material.

15. The piston core of claim 10 further comprising a middle ring about the inner core 104.

5 16. The piston core of claim 10 wherein the inner core is laminated.

17. The piston core of claim 10 wherein the first ring is laminated.

10 18. A high-performance piston core, comprising:
a first piston cylinder;
a second piston cylinder; and
a piston center, the piston center being longitudinally disposed between
and magnetically coupling the first piston cylinder and the second piston cylinder, the
piston center including a flux bottleneck,
15 wherein the flux bottleneck is made of high-performance magnetic
material.

19. The piston core of claim 18 wherein the high-performance magnetic
material is selected from the group consisting of Cobalt steel (CoFe), Silicon steel (SiFe),
20 Vanadium/Cobalt steel (Permendur), and alloys thereof.

20. The piston core of claim 18 wherein the flux bottleneck has a flux density
greater than 1.5 Tesla.

25 21. The piston core of claim 18 wherein the first piston cylinder includes a
low flux density region and the low flux density region is made of conventional magnetic
material.

22. The piston core of claim 21 wherein the low flux density region has a flux
30 density less than 1 Tesla.

23. The piston core of claim 18 wherein the first piston cylinder includes a second flux bottleneck and the second flux bottleneck is made of the high-performance magnetic material.

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24. The piston core of claim 23 wherein the high-performance magnetic material is selected from the group consisting of Cobalt steel (CoFe), Silicon steel (SiFe), Vanadium/Cobalt steel (Permendur), and alloys thereof.

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25. A high-performance piston core, comprising:
a first piston cylinder, the first piston cylinder including a flux bottleneck;
a second piston cylinder; and
a piston center, the piston center being longitudinally disposed between
and magnetically coupling the first piston cylinder and the second piston cylinder,

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wherein the flux bottleneck is made of high-performance magnetic material.

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26. The piston core of claim 25 wherein the high-performance magnetic material is selected from the group consisting of Cobalt steel (CoFe), Silicon steel (SiFe), Vanadium/Cobalt steel (Permendur), and alloys thereof.